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ABSTRACT

This activity guide, developed to provide hands-on environmental education activities geared towards the Falls Lake State Recreation Area in North Carolina, is targeted for grades 3, 4, and 5 and meets curriculum objectives of the standard course of study established by the North Carolina Department of Public Instruction. Three types of activities are included: pre-visit, on-site, and post-visit. The on-site activity is conducted at the park, while pre- and post-visit activities are designed for the classroom. The activities are designed to teach students the basic fundamentals of a food chain and food web, and how human impact can affect each of these energy chains. Major concepts included are: food chains, food webs, interaction of individuals in a community, and human impact on the environment. Includes a vocabulary list, scheduling worksheet, parental permission form, North Carolina Parks and Recreation program evaluation, and information about Falls Lake State Recreation Area. (MKR)

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GUESS WHAT'S

FOR DINNER

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Falls Lake State Recreation Area

An Environmental Education Learning Experience

Designed for Grades 3-5

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GUESS WHAT'S

FOR DINNER

Falls Lake State Recreation Area

An Environmental Education Learning Experience

Designed for Grades 3-5

Bright and warm sunshine
you are the force from which energy flows,
passing on your energy
enabling plants to grow.

Tender and green plant
you transfer your energy through
becoming food for animals
and feeding the human race too.

After every transfer of energy
all of life stands to gain
for life can only exist
because of the Food Chain.

- Merri Martin

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CP&L

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was developed by

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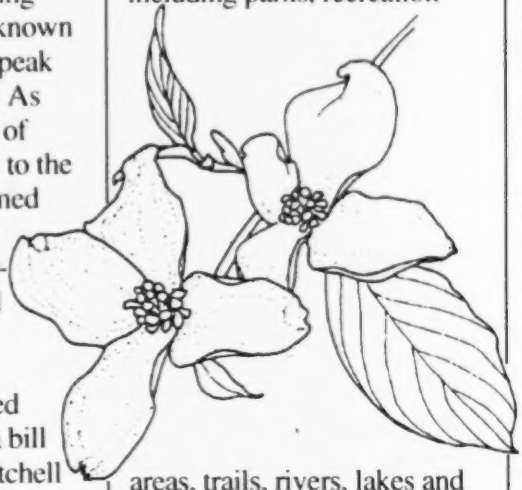
Introduction to the North Carolina State Parks System

Preserving and protecting North Carolina's natural resources is actually a relatively new idea. The seeds of the conservation movement were planted early in the 20th century when citizens were alerted to the devastation of Mount Mitchell. Logging was destroying a well-known landmark - the highest peak east of the Mississippi. As the magnificent forests of this mile-high peak fell to the lumbermen's axe, alarmed citizens began to voice their opposition. Governor Locke Craig joined them in their efforts to save Mount Mitchell. Together they convinced the legislature to pass a bill establishing Mount Mitchell as the first state park.

That was in 1915. The North Carolina State Parks System has now been established for more than three quarters of a century. What started out as one small plot of public land has grown into 59 properties across the state, including parks, recreation



areas, trails, rivers, lakes and natural areas. This vast network of land boasts some of the most beautiful scenery in the world and offers endless recreation opportunities. But our state parks system offers much more than scenery and recreation. Our lands and waters contain unique and valuable archaeological, geological and biological resources that are important parts of our natural heritage.

As one of North Carolina's principal conservation agencies, the Division of Parks and Recreation is responsible for the more than 125,000 acres that make up our state parks system. The Division manages these resources for the safe enjoyment of the public and protects and preserves them as a part of the heritage we will pass on to generations to come.

An important component of our stewardship of these lands is education. Through our interpretation and environmental education services, the Division of Parks and Recreation strives to offer enlightening programs which lead to an understanding and appreciation of our natural resources. The goal of our environmental education program is to generate an awareness in all individuals which cultivates responsible stewardship of the earth.

For more information contact:

NC Division of Parks and Recreation
P.O. Box 27687
Raleigh, NC 27611-7687
919/ 733-4181

Introduction to Falls Lake State Recreation Area

Falls Lake State Recreation Area is located in Raleigh off of N.C. Highway 50. The lake was established in 1981 by the U.S. Army Corps of Engineers to control damaging floods and to supply a source of water for surrounding communities. At present, the Falls Lake Project consists of 38,000 acres of land and water, and is managed by the U.S. Army Corps Of Engineers, North Carolina Wildlife Resources Commission and the North Carolina Division of Parks and Recreation.

Numerous recreation facilities and a variety of educational opportunities make Falls Lake a memorable place to visit. One of the most outstanding natural features of the park is the diversity of wildlife existing just outside a major metropolitan area. Here, students can learn how plants and animals interact and how they are interdependent in the cycle of life.

Groups are encouraged to visit the park during all seasons for hikes, exploration, environmental education programs and activities. Leaders may choose to conduct their own activities or enlist the help of park staff. Park staff will make every effort to accommodate persons with disabilities.

Our Environmental Education Learning Experience is held outside. If weather conditions prohibit us from holding the program outside, we will provide a modified version in the park office. Other programs may be re-scheduled due to bad weather. If you need to cancel your trip, please notify the park office as soon as possible.

Scheduling a Trip:

1. Please contact the park one month in advance to schedule an Environmental Education Learning Experience. For other types of programs, including special requests, please contact the park at least two weeks in advance.

2. Complete the scheduling worksheet provided at the back of the activity packet on page 8.1.

Before the Trip:

1. Group coordinators should visit the park without the participants prior to the group trip. This will enable you to become familiar with the facilities and park staff and to identify any potential problems.

2. Group coordinators should discuss park rules and behavior expectations with adult leaders and participants. Safety should be stressed.

3. Everyone should wear a name tag. Please color-code tags (for groups) and establish a buddy system.

4. Inform the group about poison ivy, ticks and snakes. You may want to bring insect repellent in the spring and summer.

5. Make sure the students and adult leaders dress appropriately for the season. Comfortable walking shoes and clothes that can get dirty are recommended.

6. *The group leader is responsible for parental permission forms, located at the back of this packet on page 8.2, and the group's medical and health needs.*

7. *If you will be late or need to cancel your trip, notify the park immediately.*

8. Research activity permits may be required for activities requiring samples to be taken from the park. Contact the park office for permit forms.

9. Complete the pre-visit activity in the Environmental Education Learning Experience.

While at the Park:

Please obey the following rules:

1. To help you get the most out of the experience and increase the chance of observing wildlife, be as quiet as possible while in the park.

2. On hikes, walk behind the leader at all times. Stay on the trails.

3. When hiking the trails, exercise special care in areas with loose gravel, water bars, exposed roots or steps. No running or jumping is permitted.

4. All plants and animals within the park are protected. Breaking plants and harming animals are prohibited in all state parks. This allows future visitors the same opportunity to enjoy our natural resources.

5. Picnic in designated picnic areas only. Help keep the park clean and natural; do not litter.

6. In the case of an accident or emergency, contact the park staff immediately.

Following the Trip:

1. Complete the post-visit activity in the Environmental Education Learning Experience packet.

2. Build upon the field experience and encourage participants to seek answers to questions and problems encountered at the park.

3. Relate the experience to classroom activities and curriculum through reports, projects, demonstrations, displays and presentations.

4. Give tests or evaluations, if appropriate, to determine if students have gained the desired information from the experience.

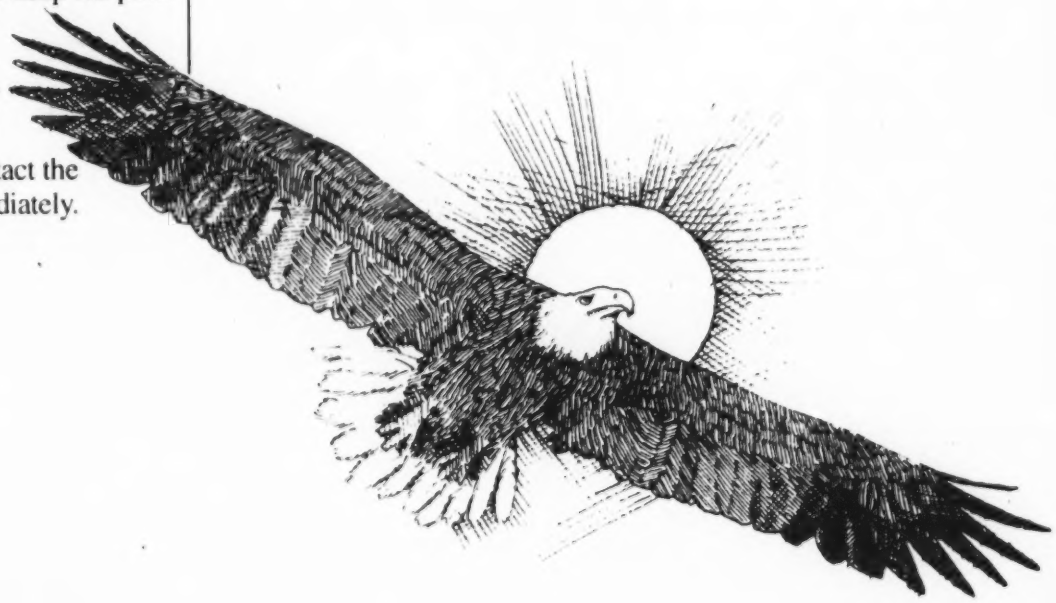
5. File a written evaluation of the experience with the park. Evaluation forms are available from park staff and in this activity packet on page 8.3. Seasonal entrance fees are charged at Falls Lake State Recreation Area. These fees supplement operational costs and help to maintain and improve our recreation areas for park visitors.

Park Information:

Falls Lake State Recreation Area
13304 Creedmoor Road
Wake Forest, N.C. 27703
Tel: (919) 676-1027

Hours of Operation:

Nov - Feb	8:00 a.m. - 6:00 p.m.
Mar, Oct	8:00 a.m. - 7:00 p.m.
Apr,May,Sep	8:00 a.m. - 8:00 p.m.
Jun - Aug	8:00 a.m. - 9:00 p.m.



Introduction to the Activity Packet for Falls Lake State Recreation Area

The Environmental Education Learning Experience, "Guess What's For Dinner," was developed to provide environmental education through a series of hands-on activities geared towards Falls Lake State Recreation Area. This activity packet was designed to be implemented in the elementary schools for students in grades three through five. This packet also meets established curriculum objectives of the North Carolina school system. It includes three types of activities:

(1) pre-visit activity
(2) on-site activity
(3) post-visit activity

The on-site activity will be conducted in the park, while pre-visit and post-visit activities are designed for the classroom. These activities may be performed independently or in a series to build upon the students' newly gained knowledge and experiences.

"Guess What's For Dinner," is designed to teach students the basic fundamentals of a food chain and food web, and how human impact can affect each of these energy chains. It will also expose students to the following major concepts:

- **Food chains**
- **Food webs**
- **Interaction of individuals in a community**
- **Human impact on the environment**

The first occurrence of a vocabulary word used in these activities is indicated in **bold type**. Definitions are listed in the back of the activity packet. A list of the reference materials used in developing the activities follows the vocabulary list.

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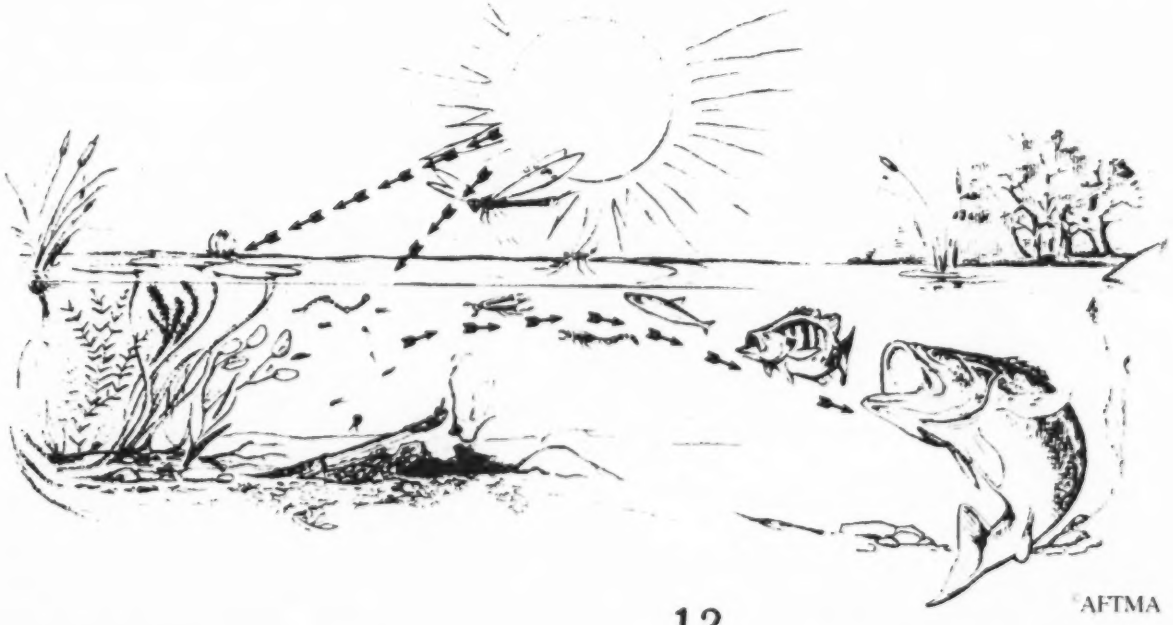
Note: On-site activities may require hiking which could expose the students to hot, humid conditions and poisonous plants and animals. Adequate adult supervision is required during school group visits to the park. Accessibility to some of the areas may be difficult for persons with special needs.



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Activity Summary

The following outline provides a brief summary of each activity, the major concepts introduced and the objectives met by completion of the activity.

I. Pre-Visit Activity

The pre-visit activity provides the student with an understanding of the food web cycle and the interdependence between plants and animals.

#1 Members of the Food Web (page 3.1.1)

Students will identify basic terminology related to the food web in an aquatic environment.

Major concepts:

- Food web
- Producers and consumers
- Herbivores, omnivores and carnivores

Objectives:

- Describe a food web using the terms: producer, consumer, herbivore, omnivore and carnivore.
- Identify three components of an aquatic food web.

II. On-Site Activity

The on-site activity provides the students with direct information and experiences relating to the cycle(s) of aquatic food chains.

#1 Falls Lake Aquatic Food Web (page 4.1.1)

Students will understand how a food web works in a water environment through a game and discussion.

Major Concepts:

- Aquatic food web
- Food chain
- Stewardship

Objectives:

- Explain an example of an aquatic food web.
- Discuss the ways humans can care for the environment to ensure plants and animals remain healthy and species survive.
- Describe how plants and wildlife become endangered.
- Give an example of a producer, a primary consumer and a secondary consumer.

III. Post-Visit Activity

The post-visit activity expands upon the earlier lessons to create a more in-depth understanding of the concepts presented.

#1 Food Chain Rummy (page 5.1.1)

Students will trace the flow of energy through food chains.

Major concepts:

- Interactions
- Food chain
- Predator
- Prey

Objectives:

- Identify three related components of a food chain.
- Name four plants and animals and where they fit in a food chain.
- Trace the flow of energy through two separate food chains.

Pre-Visit Activity #1 Members of the Food Web

Curriculum Objectives:

Grade 3
- Communication Skills: effective listening and visual comprehension, drawing
- Guidance: following instructions
- Science: animals and plants around us, animal environments
- Social Studies: work independently, effective problem solving, importance of the environment

Grade 4
- Communication Skills: listening, reading, vocabulary and viewing comprehension
- Science: living things–animals, interdependence of animals
- Social Studies: gather, organize and analyze information, draw conclusions

Grade 5
- Communication Skills: listening, reading, vocabulary and viewing comprehension
- Science: living things–plants, interdependence of plants and animals, environment
- Social Studies: gather, organize and analyze information, draw conclusions

Location: Classroom

Group Size:
15 - 30 students, class size

Estimated Time: 30 minutes

Appropriate Season: Any

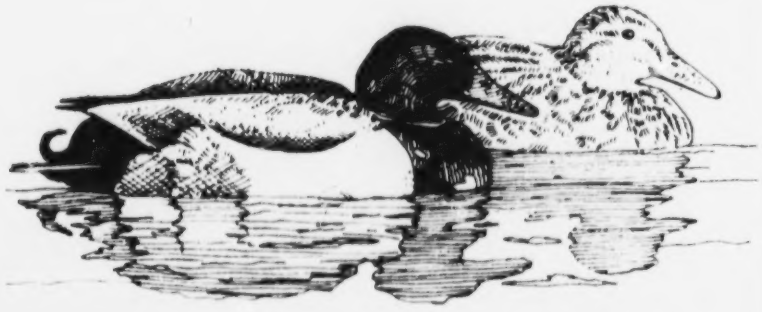
Materials:
Provided by the educator:
Per student: "Food Web Word Search" and "Members of the Food Web Matching Worksheet"

Major Concepts:

- Food web
- Producers and consumers
- Herbivores, omnivores and carnivores

Objectives:

- Describe a food web using the terms: producer, consumer, herbivore, omnivore and carnivore.
- Identify three components of an aquatic food web.



Educator's Information

The activity, "Members of the Food Web," introduces students to the basic terminology and components of a food web. Prior to handing out the worksheet entitled "Food Web Search," read the scenario entitled "Members of the Food Web" to the class. This introduces students to some of the basic plants and animals related to an aquatic food web. In addition, the story defines and gives examples of the basic terminology used to describe components of a food web.

Instructions:

1. Read the story, "Members of the Food Web," to the class. Discuss the basic terminology used to describe a food web, and discuss the different plants and animals used in the story. Categorize each animal, including the students, as a herbivore, carnivore or omnivore.

2. Pass out copies of the "Members of the Food Web" worksheet and the "Food Web Word Search." Have students complete each sheet.

Extension:

Have the students design a mural of the scene they imagine after hearing the story. Be sure to include each of the organisms mentioned.

Members of the Food Web

Imagine the scene: A large deep, narrow cove nestled off the main channel on Falls Lake in Wake County, North Carolina. The sun is rising on a late spring day and the trees along the shoreline have already bloomed, meaning that the "dog days" of summer are just ahead.

In the back of the cove the water is still. A large, fallen oak tree lies half in the water. The branches from this oak tree have been submerged for some time now and a mass of **algae**–a tiny, green, slimy **aquatic** plant–clings to its branches well beneath the water's surface. Next to this oak tree, close to the shoreline, another type of green aquatic plant floats on the surface. This particular plant forms in large groups and is a favorite food for ducks, thus giving it the name "duckweed."

Both algae and duckweed use light from the sun to live and grow. A process called **photosynthesis** converts sunlight into energy for the plants. All living things need energy to survive. Plants, however, are the only living things that can use energy directly from the sun. Plants are called **producers** since they produce their own food.

Animals are called **consumers**, since they have to consume, or eat something, to get needed energy. One of Falls Lake's consumers is a fish called a gizzard shad. The gizzard shad can grow as long as sixteen inches and is shiny silver in color. Since the gizzard shad eats algae and green plants, and not other animals, it is an **herbivore**. Another herbivore living on Falls Lake is the mallard duck. The mallard duck feeds primarily on duckweed and nests in tall reeds close to the water's edge. An herbivore that feeds on much larger plants is the beaver. Beavers eat the bark of trees and use the rest of the tree to build their dams and lodges.

Lurking beneath the water, near the beaver's lodge, are two types of fish. The bluegill, a dark green fish, feeds on insects and green plants. The largemouth bass, dark green with silver stripes on its side, eats small fish and insects.

Along the shoreline, a masked bandit known as the raccoon searches for fish close to the water's edge or for berries from nearby bushes. Since the raccoon, like the bluegill, eats both plants and animals, it is an **omnivore**. Another Falls Lake omnivore is swimming past the raccoon. It is the smaller cousin of the beaver–the muskrat. He is searching for his favorite food, cattails. Muskrats also eat crayfish, frogs and fish.

At the back of the cove, perched high in the top of a tree, a bald eagle awaits the chance to swoop down and catch a fish swimming near the water's surface. Since the eagle only feeds on other animals, it is called a **carnivore**. Another carnivore, not as impressive as the eagle, is the frog. Frogs eat insects and worms. Remember the largemouth bass that was lurking under the water? It, too, is a carnivore.

Within this cove are all forms of energy. The sun gives energy to green plants. The green plants provide energy for certain types of animals, who in turn may be a food source and provide energy for larger animals. Each link, from sun to plant to animal, from producer to consumer, creates a separate **food chain** which interacts with other food chains, thus creating a **food web**.

Members of the Food Web Matching Worksheet

Instructions: Fill in the blank with the correct number.

1. Raccoon	____	Large bird that eats mainly fish and lives near water.
2. Producer	____	Green, slimy plant that clings to dead trees and stumps below the water's surface and is a food source for small fish.
3. Largemouth bass	____	Masked bandit that lives on land and eats berries and fish.
4. Bluegill	____	Small silver fish that feeds on algae.
5. Muskrat	____	Fish that is dark green with silver stripes on its side and eats small fish.
6. Algae	____	A tiny, green floating plant that forms in dense groups on the water's surface. This particular plant is a favorite food of waterfowl.
7. Beaver	____	This particular sunfish is dark green in color and feeds on algae and insects.
8. Herbivore	____	An interaction between plants and animals that creates a food web.
9. Carnivore	____	An organism which must eat to get energy.
10. Omnivore	____	An environment that relates to water.
11. Photosynthesis	____	An animal that eats only plants.
12. Frog	____	An animal that eats both plants and animals.
13. Food chain	____	An animal that eats only meat.
14. Aquatic	____	An organism that receives energy through photosynthesis, including all green plants.
15. Consumer	____	A small green carnivore.
16. Gizzard shad	____	Omnivore cousin to the beaver.
17. Duckweed	____	The process plants use to convert sunlight to energy.
18. Bald eagle	____	Herbivore that eats tree bark.

Members of the Food Web Matching Answer Sheet

Instructions: Fill in the blank with the correct number.

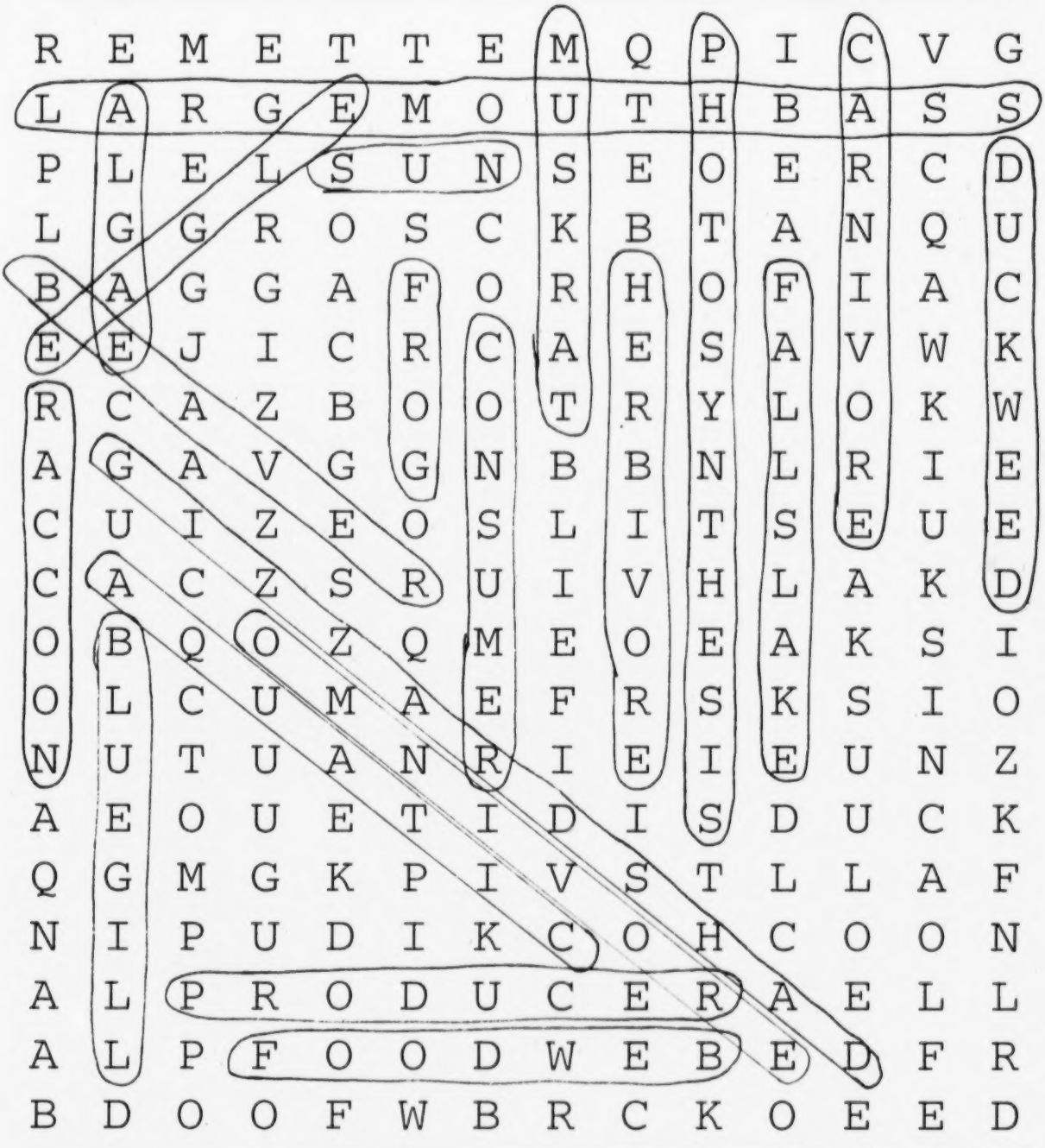
1. Raccoon	18	Large bird that eats mainly fish and lives near water.
2. Producer	6	Green, slimy plant that clings to dead trees and stumps below the water's surface and is a food source for small fish.
3. Largemouth bass	1	Masked bandit that lives on land and eats berries and fish.
4. Bluegill	16	Small silver fish that feeds on algae.
5. Muskrat	3	Fish that is dark green with silver stripes on its side and eats small fish.
6. Algae	17	A tiny, green floating plant that forms in dense groups on the water's surface. This particular plant is a favorite food of waterfowl.
7. Beaver	4	This particular sunfish is dark green in color and feeds on algae and insects.
8. Herbivore	13	An interaction between plants and animals that creates a food web.
9. Carnivore	15	An organism which must eat to get energy.
10. Omnivore	14	An environment that relates to water.
11. Photosynthesis	8	An animal that eats only plants.
12. Frog	10	An animal that eats both plants and animals.
13. Food chain	9	An animal that eats only meat.
14. Aquatic	2	An organism that receives energy through photosynthesis, including all green plants.
15. Consumer	12	A small green carnivore.
16. Gizzard shad	5	Omnivore cousin to the beaver.
17. Duckweed	11	The process plants use to convert sunlight to energy.
18. Bald eagle	7	Herbivore that eats tree bark.

Food Web Word Search

R E M E T T E M Q P I C V G
L A R G E M O U T H B A S S
P L E L S U N S E O E R C D
L G G R O S C K B T A N Q U
B A G G A F O R H O F I A C
E E J I C R C A E S A V W K
R C A Z B O O T R Y L O K W
A G A V G G N B B N L R I E
C U I Z E O S L I T S E U E
C A C Z S R U I V H L A K D
O B Q O Z Q M E O E A K S I
O L C U M A E F R S K S I O
N U T U A N R I E I E U N Z
A E O U E T I D I S D U C K
Q G M G K P I V S T L L A F
N I P U D I K C O H C O O N
A L P R O D U C E R A E L L
A L P F O O D W E B E D F R
B D O O F W B R C K O E E D

FALLS LAKE
SUN
ALGAE
DUCKWEED
PHOTOSYNTHESIS
RACCOON
EAGLE
FROG
FOOD WEB
AQUATIC
BEAVER
MUSKRAT
HERBIVORE
OMNIVORE
CARNIVORE
GIZZARD SHAD
BLUEGILL
PRODUCER
CONSUMER
LARGEMOUTH BASS

Food Web Word Search Answers



FALLS LAKE	RACCOON	BEAVER	GIZZARD SHAD
SUN	EAGLE	MUSKRAT	BLUEGILL
ALGAE	FROG	HERBIVORE	PRODUCER
DUCKWEED	FOOD WEB	OMNIVORE	CONSUMER
PHOTOSYNTHESIS	AQUATIC	CARNIVORE	LARGEMOUTH BASS

On-Site Activity #1 Falls Lake Aquatic Food Web

Curriculum Objectives:
Grade 3
- Communication Skills: effective listening
- Guidance: group participation, effective listening skills, cooperation
- Science: interdependence, human-use effects
- Social Studies: importance of the environment

Grade 4
- Communication Skills: listening, reading, vocabulary and viewing comprehension
- Guidance: competency for interacting with others
- Science: living things–animals, interdependence of animals
- Social Studies: participate effectively in groups

Grade 5
- Communication Skills: listening, reading, vocabulary and viewing comprehension
- Guidance: competency for interacting with others
- Science: living things–plants, interdependence of plants and animals, environment
- Social Studies: participate effectively in groups

Location:
Applicable for indoor or outdoor use.

Group Size:
15 - 30 participants

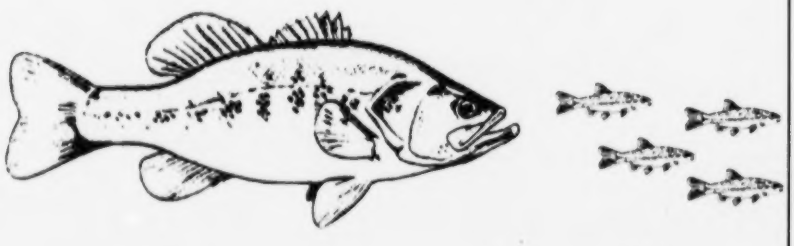
Estimated Time: 40 minutes

Appropriate Season: Any

Materials:
Provided by the park:
Pictures of plants and animals used in the Aquatic Food Web game; one ball each of yellow, green, red and brown twine; plant and animal cards; blackboard or flip chart; marker or chalk

Major Concepts:
- Aquatic food web
- Food chain
- Stewardship

Objectives:
- Explain an example of an aquatic food web.
- Discuss the ways humans can care for the environment to ensure plants and animals remain healthy and species survive.
- Describe how plants and wildlife become endangered.
- Give an example of a producer, a primary consumer and a secondary consumer.



Educator's Information:

An organism is a living individual, plant or animal. All organisms need energy to survive. They receive their energy by absorbing energy from something else. The absorption of energy from one organism to another is called a food chain. An interlocking series of food chains is a food web. The fundamentals of one of the common aquatic food webs found at Falls Lake are provided through the following information.

Instructions:

1. Ask the students the following questions:

Do all **organisms** need energy in order to survive? (Yes!)

If all organisms need energy, how do they get this energy? (By absorbing energy from **photosynthesis**, eating or absorbing nutrients.)

Talk to the students about where they get their energy every day.

2. Using a blackboard or flip chart, define:

Food Chain: A food chain or energy chain involves the transfer of food energy from one organism to another when one organism eats another.

Draw out a food chain with the transfer of energy starting

at the sun, then being absorbed by green plants, which are then eaten by some type of animal and lastly that animal is eaten by another animal. This should help students understand the concept of the food chain.

After explaining the term "food chain," use participants in the class to demonstrate a simple food chain. Example: (sun - **algae** -bluegill fish - eagle). Have the participants stand in a line side by side. Upon the leader's instruction, have them place one hand on the shoulder of the person standing beside them, as one organism receives energy or food from the other.

Food Web: Food webs are interlocking series of food chains. This term may be explained by telling students that a food web is a large number of food chains linked to each other.

To illustrate the idea of a food web you may want to draw out a food web by building upon the previously used food chain. You can attach other chains and talk about how some animals may eat other animals and plants, thus making it a series of **interactions**. This can be further demonstrated by interlocking all of your fingers from one hand together with the fingers of your other hand, to show different food chains linking together.

3. Discuss and define the following terms. Have the students share familiar examples.

Producer: all green plants.

Herbivore: animal which eats only green plants.

Carnivore: animal which eats only meat.

Omnivore: animal which eats both meat and plants.

Decomposer: micro-organisms which break down dead plants and animals.

Primary consumer: animal that gets energy from eating plants.

Secondary consumer: animal that gets energy by eating other animals.

Discuss the difference between an **aquatic** food chain and a **terrestrial** food chain. Remember that these areas may overlap, such as the case of the raccoon and other animals which may live in one **environment** and consume food in both environments.

Aquatic food chains: food chains located in water related environments.

Terrestrial food chains: food chains located on land related environments.

4. Using the pictures provided, describe where to find the following plants and animals that are related in an aquatic food web at Falls Lake. Discuss what type of **habitat** each lives in and how each one obtains energy or food.

Plant/Animal	Habitat	Energy Source
Algae (producer)	**water**	**sunlight**
Duckweed (producer)	**water**	**sunlight**
Mallard Duck (herbivore)	**on/around water**	**algae & duckweed**
Gizzard Shad (herbivore)	**water**	**plankton**
Bluegill (omnivore)	**water**	**insects, minnows & algae**
Largemouth Bass (carnivore)	**water**	**frogs, bluegills, insects and shad**
Raccoon (omnivore)	**land**	**fish, insects & grain**
Bald Eagle (carnivore)	**land, around water**	**mallard ducks, raccoons & largemouth bass**

You are now ready to begin the Aquatic Food Web Game.

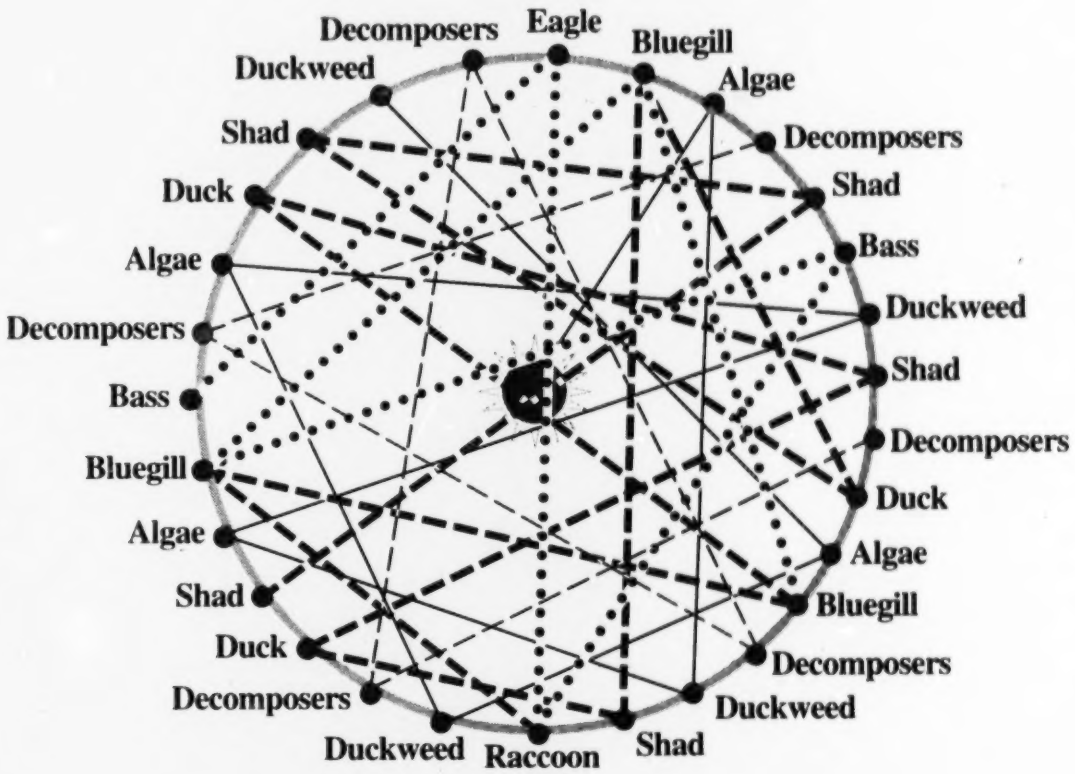
5. Have participants form a circle and select one student to be the sun. Give this student the sun card and have him or her stand in the center of the circle. Distribute the plant and animal cards to the rest of the students. About half of the students should be "plants" and the rest of the students should be given animal or decomposer cards.

Note: Distribution of the plant and animal cards should be staggered so that about every third participant is holding a plant card.

Demonstrate the levels and complexity of an aquatic food web by weaving twine between the major energy sources until each participant is holding a piece of twine. Start the distribution of the yellow twine with the sun, the source of all energy. Pass the yellow twine to each of the green plants, the only organisms that can use the sun's energy directly to produce food. Tell the plants the yellow color represents the sun – their source of energy.

Next, start the green twine with one of the herbivores, the animals that gain their energy by eating plants, and pass it to all the herbivores, or primary consumers, in the circle. Be sure to pass it to all the omnivores as well, since they also eat plants. The green color should remind the herbivores and omnivores that they get their energy from eating green plants.

After the green twine has been distributed, start the red twine with one of the carnivores, animals that get their energy by eating meat, and pass it to all the carnivores, or secondary consumers. Note: the omnivores in the circle will now be holding both red and green twine, signifying the two different sources of their energy.



Finally, connect all the decomposers with the brown twine. These bacteria and microbes feed on dead plants and animals and, in the process, return nutrients to the soil to enrich the next generation of green plants.

Once the twine is completely distributed, tell the students they are a well-balanced aquatic food web. Ask the students what they think would happen if something interrupted the flow of energy anywhere in the food web.

6. Tell them a huge amount of sediment washed into the lake, blocking the sunlight. Have all the plants sit down, signifying that they died. How will this affect the primary and secondary consumers? The decomposers? (Since many producers would die, many of the primary and secondary consumers would also die or leave the area. The decomposers would flourish for a while, with all of the dead plant and animal material. Eventually, however, they too would die without a continued energy source. Finally, without the nutrients provided by the decomposers, no new plants would grow.)

As the plants sit, the yellow twine they hold, intertwined with the other colors, will tug on the strings of the primary and secondary consumers. After all the plants have "died," have all of the other participants who felt a tug on the string that they were holding sit down. Most, if not all, the students will sit. This clearly demonstrates to the students the interdependency of the different levels of the food web.

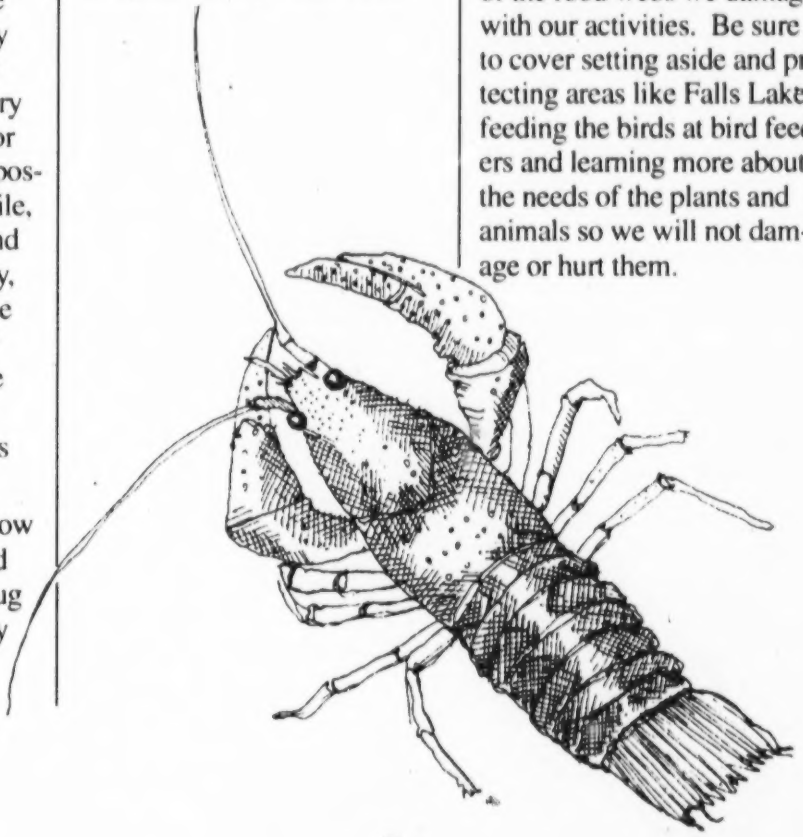
7. Lead a group discussion on the following issues:

A. What would happen if small amounts of poison, like **DDT**, got into the plants. (It would accumulate in the consumers until it got so concentrated it would injure or kill the animals.)

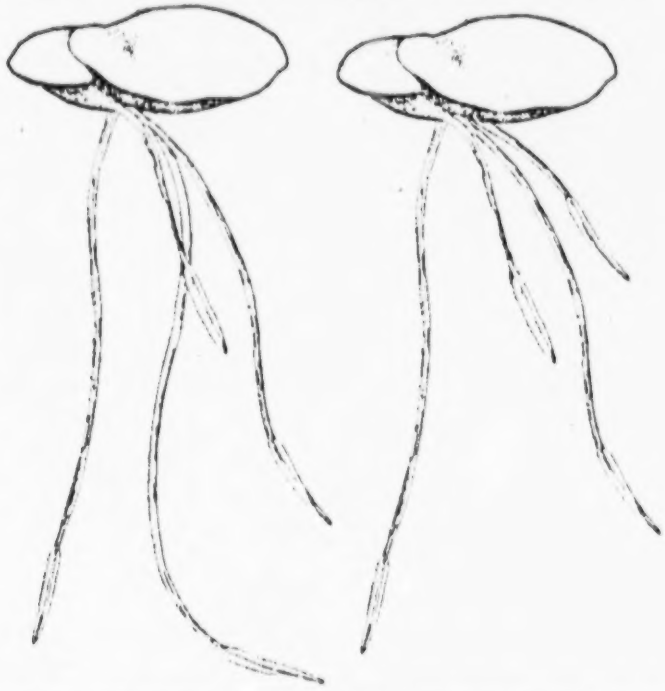
B. How might water **pollution** affect the aquatic food web? Use examples like herbicides, oil spills, sewage, etc. (The water pollution kills the plants and in turn, all the other elements will die.)

C. How might air pollution affect the aquatic food web? Use examples like acid rain and smog. (In the case of acid rain, the water becomes increasingly acidic, eventually killing the plants. In the case of smog, the sunlight is blocked by the smog, thus depriving the aquatic plants of necessary energy.)

D. How do they think humans affect the food web? Talk about pollution, land clearing activities, trash disposal and any other negative activities you are familiar with. Then, talk about the positive ways people help maintain many of the food webs we damage with our activities. Be sure to cover setting aside and protecting areas like Falls Lake, feeding the birds at bird feeders and learning more about the needs of the plants and animals so we will not damage or hurt them.

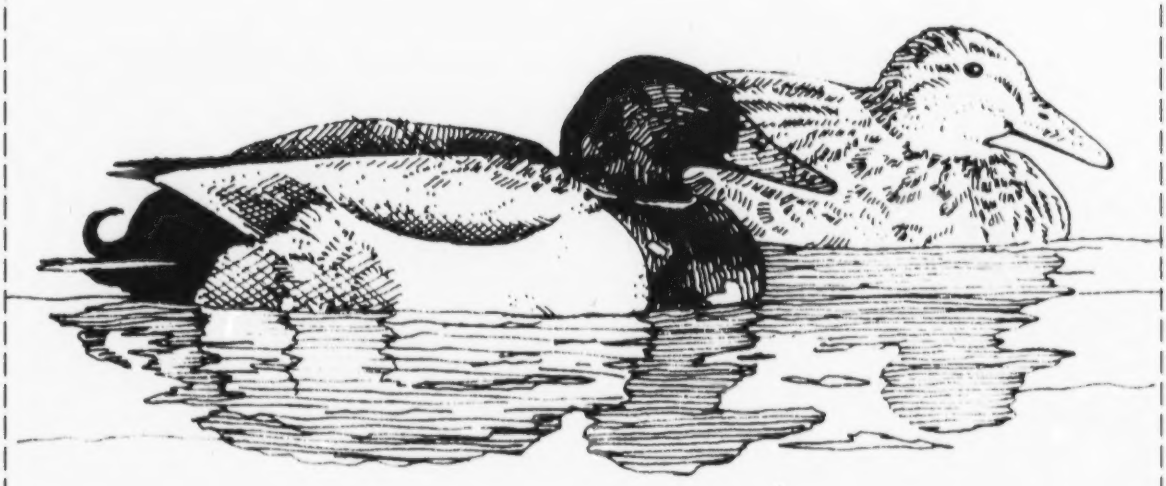


Duckweed (producer)

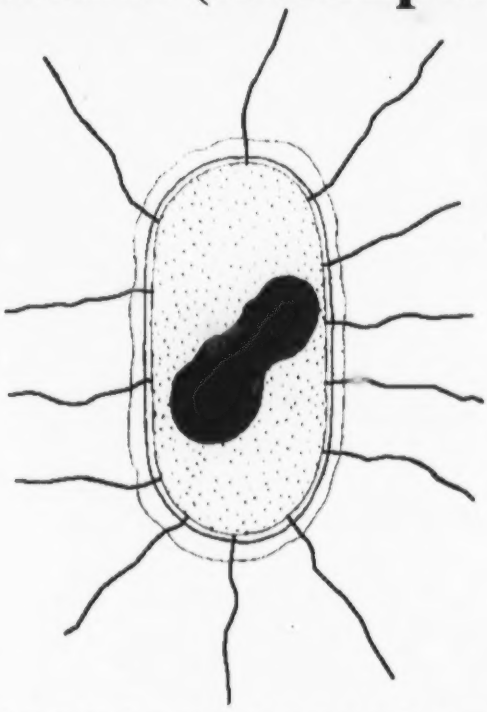


Algae (producer)

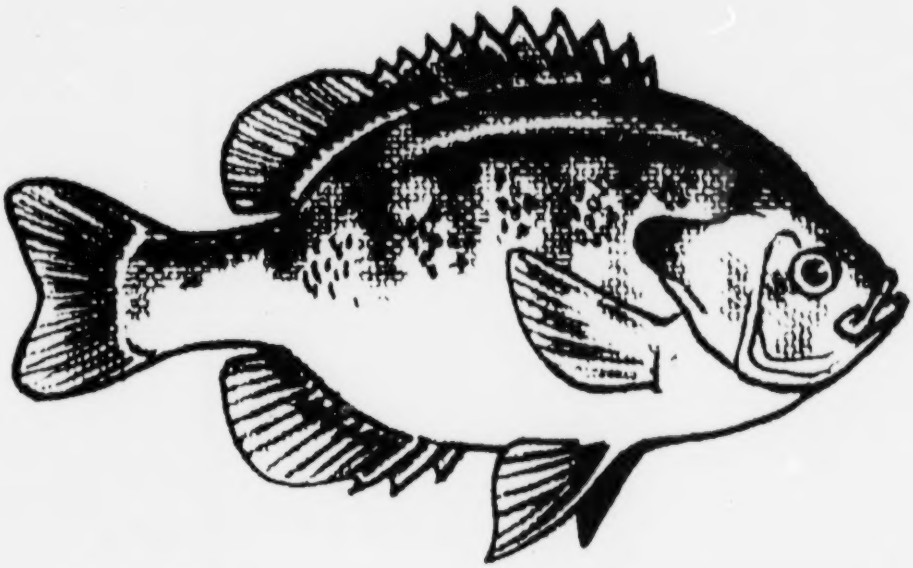
Mallard Duck (herbivore)



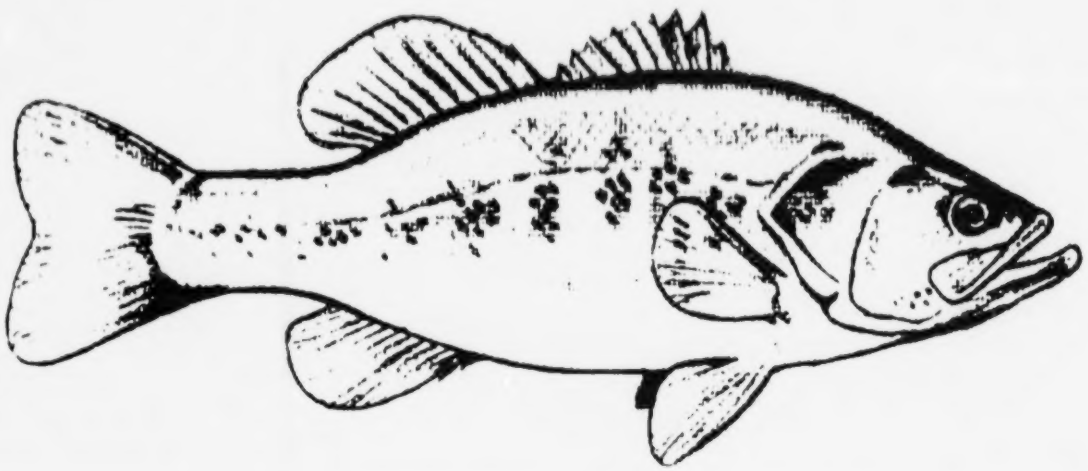
Bacteria (decomposer)



Bluegill (omnivore)

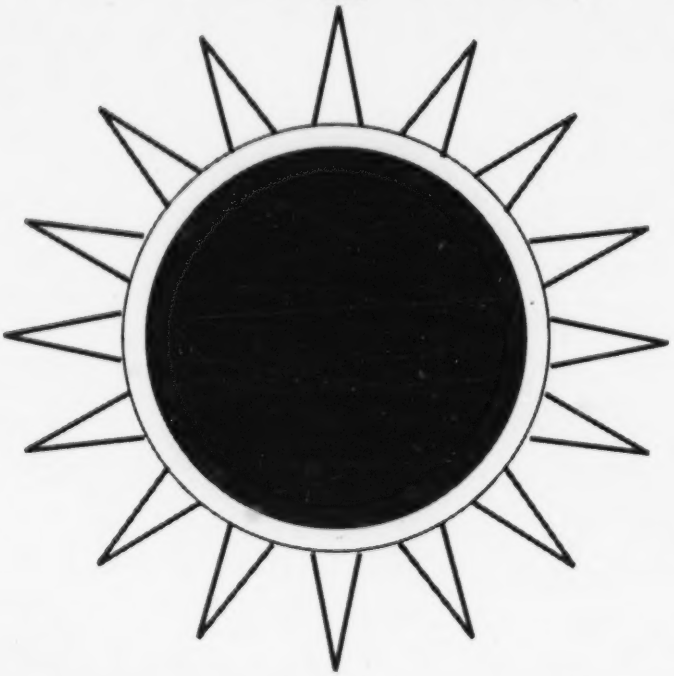


Largemouth Bass (carnivore)



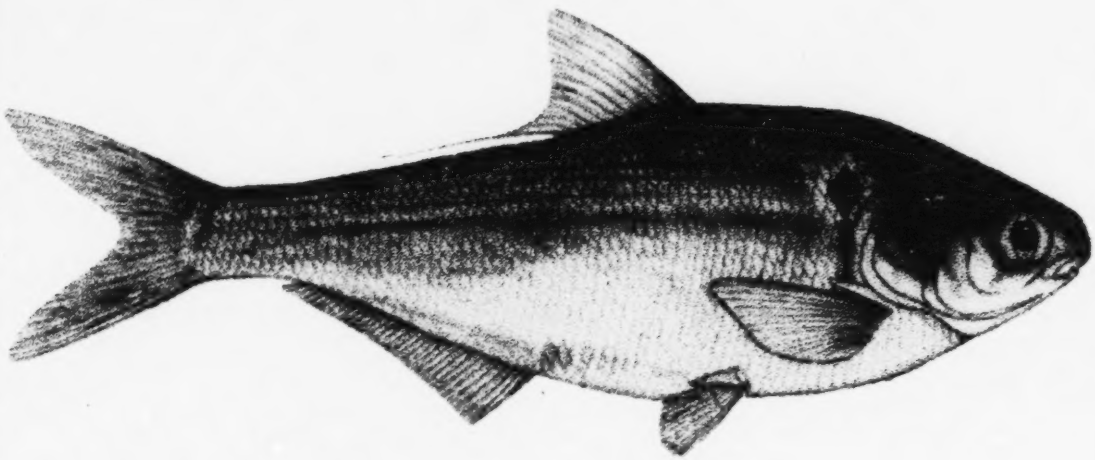
Raccoon (omnivore)

Sun (energy source)



Bald Eagle (carnivore)

Gizzard Shad (herbivore)



Post-Visit Activity #1 — Food Chain Rummy

Curriculum Objectives:

Grade 3
- Communication Skills: effective speech, listening and visual comprehension, role of reading
- Guidance: group interaction, work and share cooperatively, following instructions
- Science: interdependence of plants and animals, human impacts
- Social Studies: cooperation, problem solving, importance of the environment, role of rules

Grade 4
- Communication Skills: listening, reading, vocabulary and viewing comprehension
- Guidance: competency for interacting with others
- Science: living things–animals, interdependence of animals
- Social Studies: participate effectively in groups

Grade 5
- Communication Skills: listening, reading, vocabulary and viewing comprehension
- Guidance: competency for interacting with others
- Science: living things–plants, interdependence of plants and animals, environment
- Social Studies: participate effectively in groups

Location: Classroom

Group Size:
Several groups of 4 to 5 participants.

Estimated Time:
45 minutes

Appropriate Season: Any

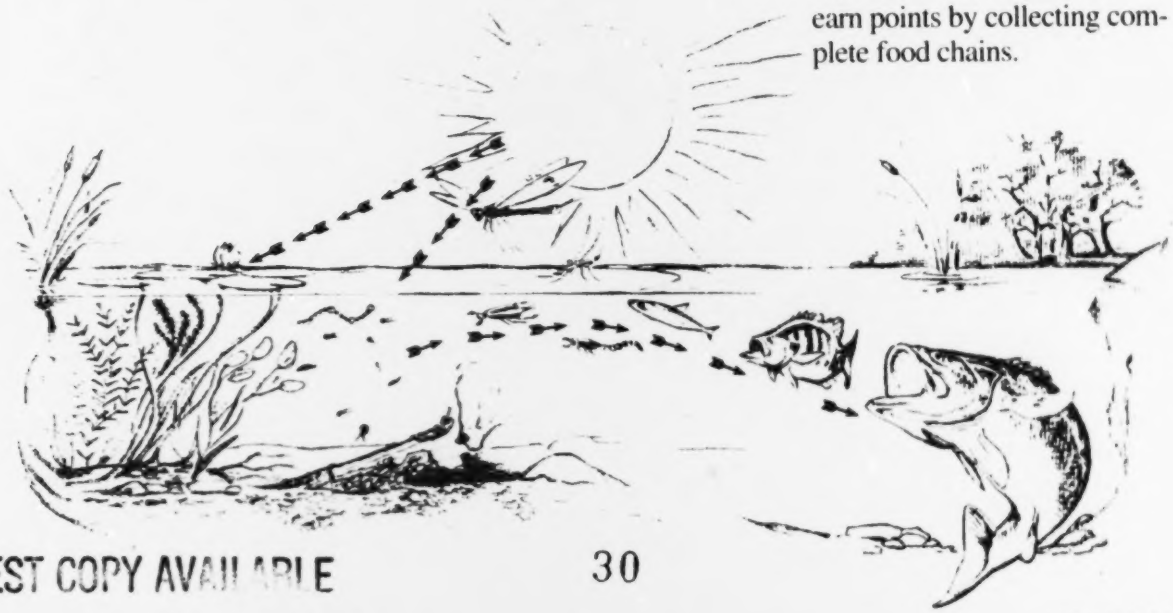
Materials:
Provided by the educator: Food Chain rummy cards (68 cards per group of 4 to 5 students)

Major Concepts:
- Interactions
- Food chain
- Predator
- Prey

Objectives:
- Identify three related components of a food chain.
- Name four plants and animals and where they fit in a food chain.
- Trace the flow of energy through two separate food chains.

Educator's Information

All living plants and animals get their energy from the sun. In order to help students follow the flow of energy, they will play a card game entitled Food Chain Rummy. The playing cards represent different components of land and water based food chains and the students will earn points by collecting complete food chains.



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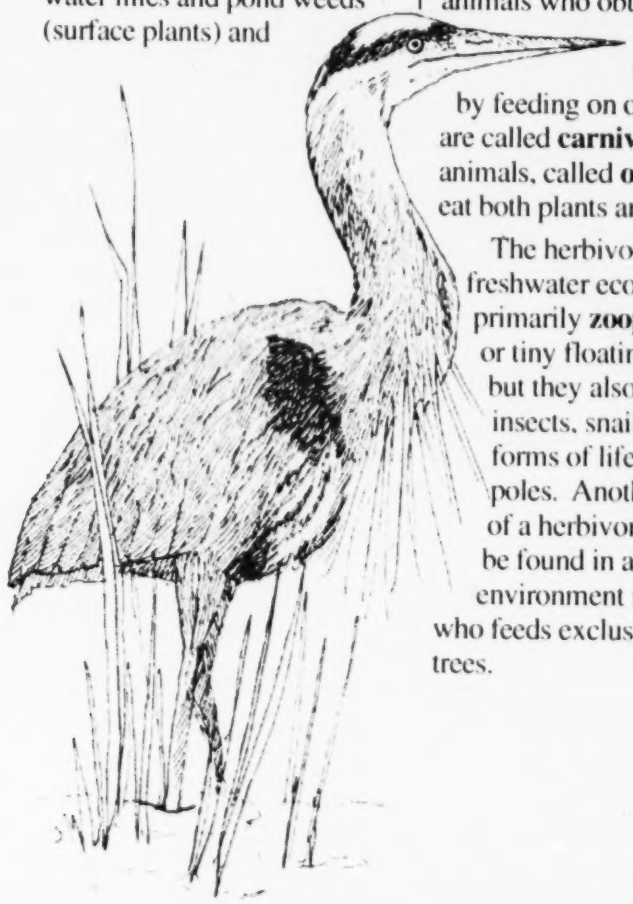
Student's Information

The **interactions** of **food chains** are the foundation of a **food web.** Food webs make up an **ecosystem,** where living **organisms** interact with each other and with their non-living **environment**. Included among the parts of a food web are green plants, called **producers,** and animals, called **consumers**. The components of the food web are inseparably linked as they interact with each other.

The producers in an **aquatic**, or water related, environment include: rooted plants, such as cattails, arrowhead plants, water lilies and pond weeds (surface plants) and floating plants, such as **algae** and duckweed. Rooted plants are abundant in shallow water near the edge of a pond or lake. Algae and duckweed are distributed throughout the water as deep as sunlight can penetrate. In most large, deep ponds and lakes, algae plays a very important role, yet we often overlook it and its value to the system.

The consumer components of a food web are the animals found in an environment. Animals that obtain their energy directly by feeding on plants are called **herbivores**. Those animals who obtain energy indirectly from plants by feeding on other animals are called **carnivores**. Other animals, called **omnivores**, eat both plants and animals.



The herbivores of a freshwater ecosystem are primarily **zooplankton**, or tiny floating animals, but they also include some insects, snails and higher forms of life such as tadpoles. Another example of a herbivore that may be found in a freshwater environment is the beaver, who feeds exclusively on trees.

The next level of an aquatic ecosystem includes carnivores. Carnivores are animals that feed on other animals for a source of energy. In the pond environment, these animals may include adult frogs, water snakes, great blue herons, largemouth bass, bluegill, turtles and hawks.

The third type of consumer is an omnivore. Omnivores are animals who eat both plants and animals as a source of food energy. Raccoons, crayfish, muskrats and foxes are common omnivores near a pond. People are also omnivores.

Finally, any organism that dies without being eaten by an animal will be broken down by **decomposers**. Decomposers are the tiny bacteria and microbes that cause decay. They are vital to a food web, because they return energy, in the form of nutrients, to the plants to start the cycle all over again.

An aquatic environment contains all forms of energy. The sun gives energy to green plants through the process of **photosynthesis**, and green plants provide energy for animals that eat plants. In return, these animals provide a food source for larger animals, thus creating a cycle of energy or a food web.

Instructions:

1. Discuss with the class the concept of a food web using the background information provided. Review the terms: aquatic, herbivore, carnivore, omnivore, producer, consumer and decomposer.

2. Copy the "Food Chain Rummy Cards" (three times for the food chains and once for the wild cards) to create a deck of 70 playing cards for each group. Cut the cards apart as indicated and laminate for durability, if desired.

3. Divide the students into groups of four to five participants. Explain to the students that they will be putting together groups of plants and animals in food chains. An example of a water based food chain is SUN—PLANT—SHAD—LARGEMOUTH BASS—DECOMPOSER. All sets must include five different cards. All sets start with the sun, then a producer, next a primary consumer card that is the appropriate animal for eating a plant, and then a secondary consumer that would eat that animal as prey. The final card will be a decomposer that will ingest the predator once it dies.

4. Pass a deck of cards out to each group. The dealer passes out 10 cards to each person in the group, including him/herself. The dealer then places the deck face down in the center of the group. The top card is placed face up next to the pile. Play starts with the player to the left of the dealer and continues clockwise around the circle. Players first check their hands for any food chain sets. If the players have any sets they may lay them down in front of them when it is their turn. If the player needs another card to complete a set, they may either pick up the top card from the deck (the one that is face down) or pick up the top card of the discard pile. After picking up a card, the player then must discard one of the cards from their hand to the top of the discard pile. Play continues until one player completes two books of food chain sets and discards his/her last card. At this point, the player yells "Food Chain Rummy" and the hand is over.

5. At the end of each hand, players receive five points for each complete five-card food chain set. The game is over when one player reaches 50 points.

6. Ask the students to summarize what they have learned.

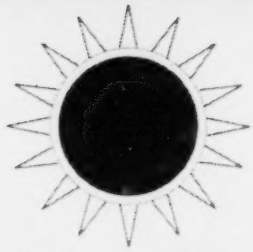
7. Distribute copies of the "Missing Pieces" crossword puzzle to the students. If time allows, have the students write a story using the vocabulary words found in the puzzle.

Extensions:

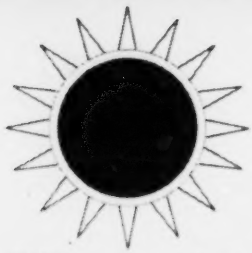
1. Showdown Challenge: Dealer deals out all cards to players. They are left face down in front of each player. Players "showdown" in pairs. Each player flips up their top card. The plant or animal highest on the food chain "wins" and the winning player takes both cards. Continue this way through the deck. If the two cards drawn are the same animal, or fit the same place in the food chain, count down four cards and flip up the fifth one. The "winner" with that fifth card gets all four cards and the game continues. The player with the most cards wins. Play for a specified time, using a time limit to end the game.

2. Invent your own set of food chain cards with different animals and plants. Allow the students to color their cards when the game is over.

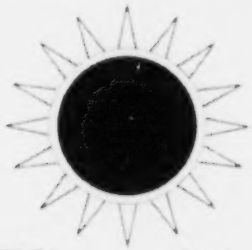
Food Chain Rummy cards



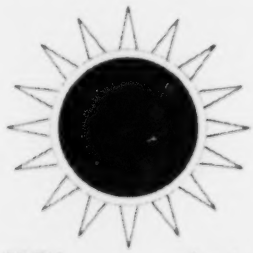
SUN → plant



SUN → plant



SUN → plant



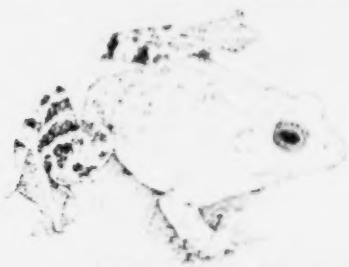
SUN → plant

sun → PLANT → shad

sun → PLANT → insect

sun → PLANT → crayfish

sun → PLANT → duck

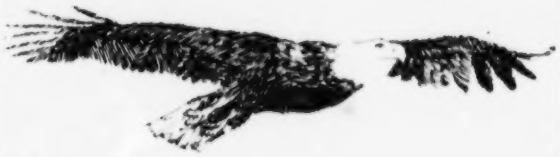


insect → FROG → decomposers

crayfish → RACCOON → decomposers

Food Chain Rummy cards

plant → SHAD → bass

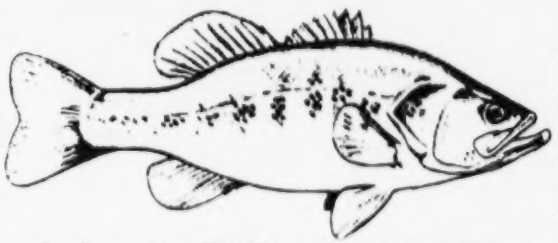


duck → EAGLE → decomposer

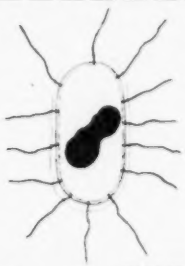
plant → INSECT → frog

plant → DUCK → eagle

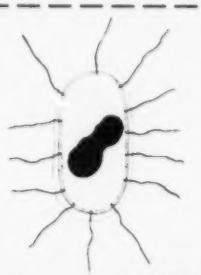
plant → CRAYFISH → raccoon



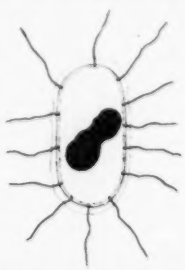
shad → BASS → decomposer



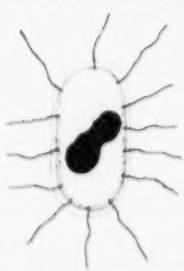
animal/plant → DECOMPOSER



animal/plant → DECOMPOSER



animal/plant → DECOMPOSER



animal/plant → DECOMPOSER

Food Chain Rummy cards

Cold Snap

All the animals are hibernating.

Skip a turn.

Drought

Food sources have died due to lack of rain.

Skip a turn.

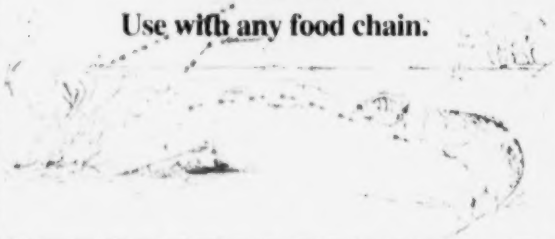
Heat Wave

Too hot to go out looking for food.

Skip a turn.

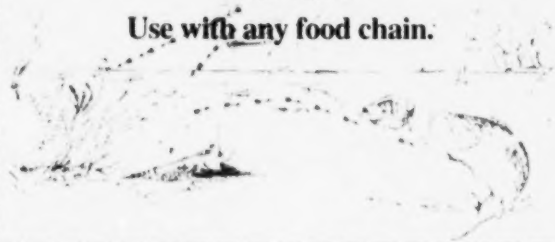
Wild Card

Use with any food chain.



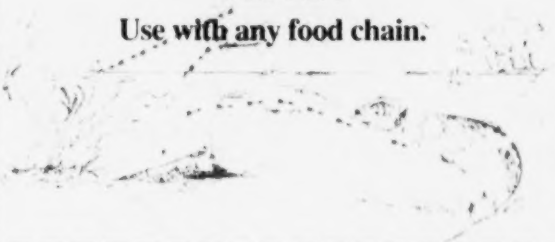
Wild Card

Use with any food chain.



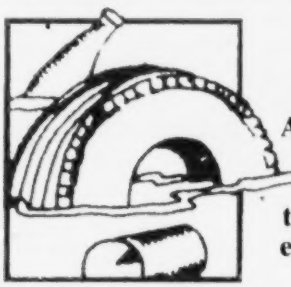
Wild Card

Use with any food chain.



Pollution Card

Your habitat has become polluted. All your complete food chains die. Place those cards back in the deck & draw an equal number of cards to replace them.



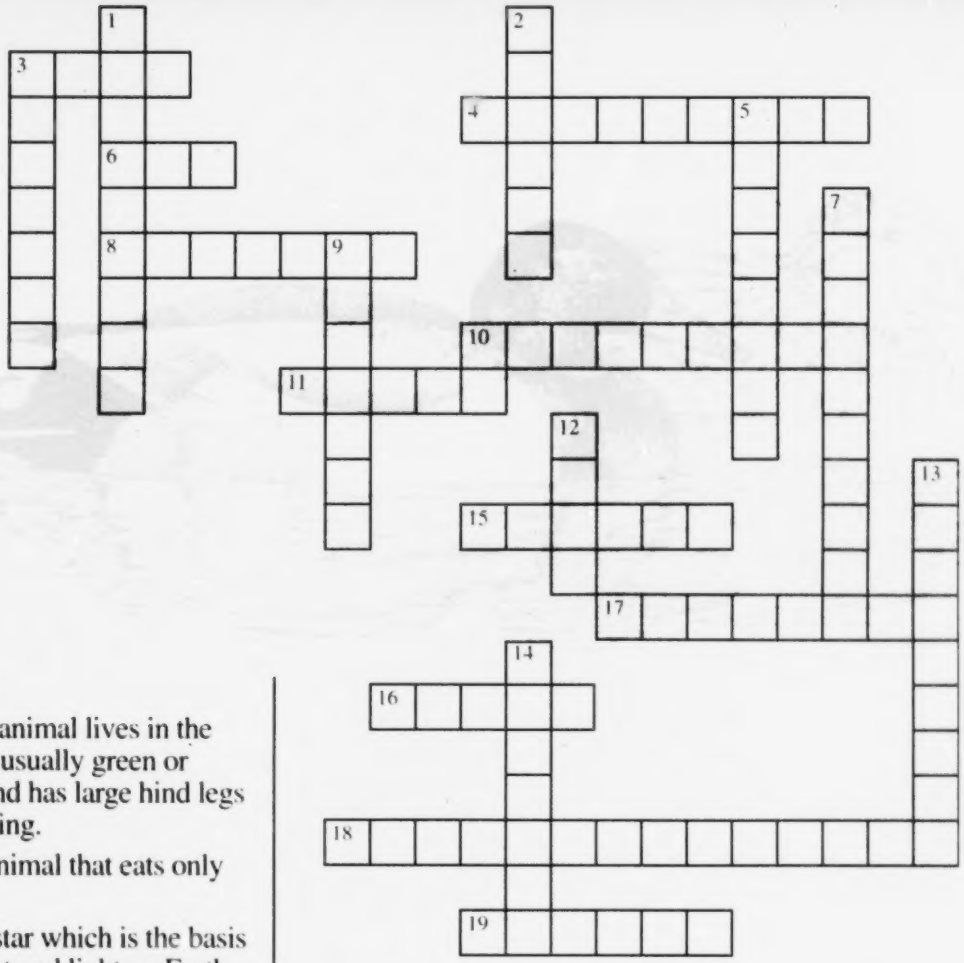
Pollution Card

Your habitat has become polluted. All the shad have died. Place all your shad, eagles & bass into the deck, and draw an equal number of cards to replace them.

crayfish → RACCOON → decomposers

plant → CRAYFISH → raccoon

Missing Pieces Crossword Puzzle



Across

3. This animal lives in the water, is usually green or brown and has large hind legs for jumping.

4. An animal that eats only meat.

6. The star which is the basis of all heat and light on Earth.

8. This reddish-brown omnivore uses aquatic lodges that are smaller than beaver lodges and made of grasses. It feeds mainly on aquatic plants; however, may eat frogs, crayfish, clams or snails.

10. A type of animal that eats only plants.

11. This large bird of prey is an endangered species, and eats mainly fish.

15. A food for frogs, snakes and fish.

16. This green, slimy plant grows in the water and produces food for fish.

17. A floating aquatic plant which is a favorite food source for ducks.

18. The process where green plants turn light into energy.

19. Eating food gives us this.

Down:

1. Animals that must eat other plants and animals for energy. These animals can also be considered omnivores, carnivores and herbivores.

2. This aquatic animal has webbed feet, eats trees and lives in a lodge made of sticks and mud.

3. An interlocking series of food chains.

5. An animal that eats both plants and animals.

7. This long skinny reptile "swims" in the water and eats fish and frogs.

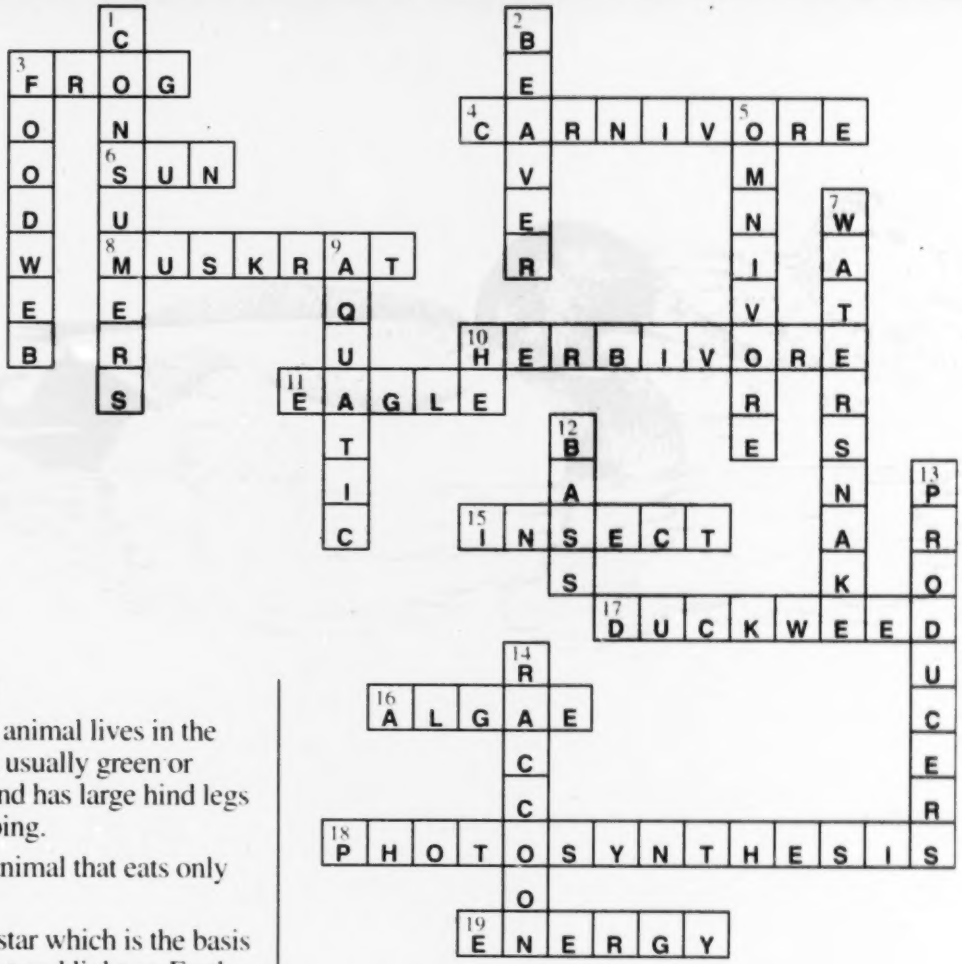
9. Another name for a water environment.

12. This fish eats gizzard shad and insects, and is called a largemouth.

13. Another name for green plants in a food chain.

14. This masked bandit eats crayfish and frogs.

Missing Pieces Crossword Puzzle with Answers


1 C
3 F R O G
O N
O 6 S U N
D U
8 M U S K R 9 A T
W Q
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15 I N S E C T N
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17 D U C K W E E D
U
14 R C
16 A L G A E E
C R
18 P H O T O S Y N T H E S I S
O
19 E N E R G Y

Across

3. This animal lives in the water, is usually green or brown and has large hind legs for jumping.

4. An animal that eats only meat.

6. The star which is the basis of all heat and light on Earth.

8. This reddish-brown omnivore uses aquatic lodges that are smaller than beaver lodges and made of grasses. It feeds mainly on aquatic plants; however, may eat frogs, crayfish, clams or snails.

10. A type of animal that eats only plants.

11. This large bird of prey is an endangered species, and eats mainly fish.

15. A food for frogs, snakes and fish.

16. This green, slimy plant grows in the water and produces food for fish.

17. A floating aquatic plant which is a favorite food source for ducks.

18. The process where green plants turn light into energy.

19. Eating food gives us this.

Down:

1. Animals that must eat other plants and animals for energy. These animals can also be considered omnivores, carnivores and herbivores.

2. This aquatic animal has webbed feet, eats trees and lives in a lodge made of sticks and mud.

3. An interlocking series of food chains.

5. An animal that eats both plants and animals.

7. This long skinny reptile "swims" in the water and eats fish and frogs.

9. Another name for a water environment.

12. This fish eats gizzard shad and insects, and is called a largemouth.

13. Another name for green plants in a food chain.

14. This masked bandit eats crayfish and frogs.

VOCABULARY

Algae - (al-jee) Primitive one-celled or multi-cellular plants that contain chlorophyll, but have no true root, stem or leaf. Normally found in water or damp places.

Aquatic - An environment which pertains to water.

Carnivore - A meat eater.

Consumer - An organism which must eat to get energy.

Decomposers - Bacteria, microbes and other organisms that obtain energy by ingesting dead organisms.

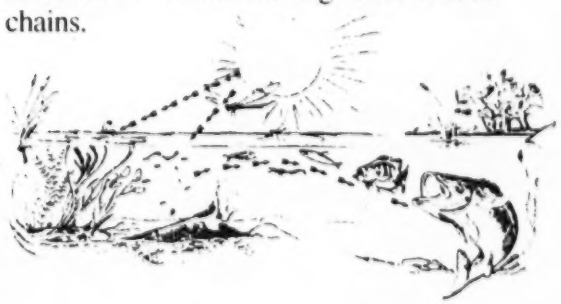
D.D.T. - (Dichloro Diphenyl Trichloroethylene) A colorless insecticide harmful to humans and animals when swallowed or absorbed through the skin.

Ecosystem - All living things and non-living things and their environment in an area of any size, with all parts being linked together by energy.

Environment - The total of all surroundings, including air, water, vegetation, human elements and wildlife, which have an influence on you and your existence.

Food chain - The transfer of food energy from the sun through plants and a series of animals.

Food web - An interlocking series of food chains.



Habitat - Food, water, shelter and space in a suitable arrangement.

Herbivore - An animal which eats only plants.

Interaction - The relationship of one organism to another; the action of one population affecting the growth or death rate of another population.

Omnivore - An animal which eats both plants and animals.

Organism - A living thing, a form of life composed of mutually dependent parts.

Photosynthesis - The complex process that occurs in the cells of green plants whereby sunlight is used to produce food for individual plants.

Pollution - Harmful substances deposited in the air, water or land, leading to a state that is unhealthy or hazardous.

Primary consumer - An herbivore or plant-eater.

Producers - Green plants which manufacture food using the energy from sunlight.

Secondary consumer - An animal which eats other consumers, a carnivore or omnivore.

Terrestrial - Pertaining to land.

Zooplankton - Floating, often microscopic, animals that live suspended in an aquatic habitat. Plankton can include both animals (zooplankton) and plants (phytoplankton).

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SCHEDULING WORKSHEET

For office use only:
Date request received_____ Request received by_____

1) Name of group (school) _____

2) Contact person _____ _____
name phone (work) (home)

_____
address

3) Day/date/time of requested program _____

4) Program desired and program length _____

5) Meeting place _____

6) Time of arrival at park _____ Time of departure from park _____

7) Number of students _____ Age range (grade) _____
(Note: A maximum of 30 participants is recommended.)

8) Number of chaperones _____
(Note: One adult for every 10 students is recommended.)

9) Areas of special emphasis _____

10) Special considerations of group (e.g. allergies, health concerns, physical limitations)_____
_____

11) Have you or your group participated in park programs before? If yes, please indicate previous programs attended: _____
_____

12) Are parental permission forms required? _____ If yes, please use the Parental Permission form on page 8.2.

I, _____, have read the entire Environmental Education Learning Experience and understand and agree to all the conditions within it.

Return to: Falls Lake State Recreation Area
13304 Creedmoor Road
Wake Forest, NC 27587

PARENTAL PERMISSION FORM

Dear Parent:

Your child will soon be involved in an exciting learning adventure - an environmental education experience at **Falls Lake State Recreation Area**. Studies have shown that such "hands-on" learning programs improve children's attitudes and performance in a broad range of school subjects.

In order to make your child's visit to "nature's classroom" as safe as possible we ask that you provide the following information and sign at the bottom. Please note that insects, poison ivy and other potential risks are a natural part of any outdoor setting. We advise that children bring appropriate clothing (long pants, rain gear, sturdy shoes) for their planned activities.

Child's name _____

Does your child:

- Have an allergy to bee stings or insect bites?_____
  If so, please have them bring their medication and stress that they, or the group leader, be able to administer it.

- Have other allergies? _____

- Have any other health problems we should be aware of?_____
  _____

- In case of an emergency, I give permission for my child to be treated by the attending physician. I understand that I would be notified as soon as possible.

_____ _____
Parent's signature date

Parent's name _____ Home phone _____
(please print) Work phone _____

Family Physician's name _____ phone _____

Alternate Emergency Contact

Name_____ phone _____

NORTH CAROLINA PARKS & RECREATION
PROGRAM EVALUATION

Please take a few moments to evaluate the program(s) you received. This will help us improve our service to you in the future.

1. Program title(s) _____ Date _____

   Program leader(s) _____

2. What part of the program(s) did you find the most interesting and useful? _____

   _____

3. What part(s) did you find the least interesting and useful? _____

   _____

4. What can we do to improve the program(s)? _____

   _____

   _____

5. General comments _____

   _____

   _____

   _____

LEADERS OF SCHOOL GROUPS AND OTHER ORGANIZED YOUTH GROUPS
PLEASE ANSWER THESE ADDITIONAL QUESTIONS:

6. Group (school) name _____

7. Did the program(s) meet the stated objectives or curriculum needs? _____

   If not, why? _____

   _____

Please return the completed form to park staff. Thank you.

Falls Lake State Recreation Area
13304 Creedmoor Road
Wake Forest, NC 27587